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EXAMINER

SAN MARTIN, EDGARDO

ART UNIT PAPER NUMBER

2837

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/028,999

Applicant(s)

BLUMENKRANZ, STEPHEN J.

Examiner

Edgardo San Martin

Art Unit

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,8-15,20,22-26,32-39,44 and 46-48 is/are rejected.
- 7) ☒ Claim(s) 3-7,16-19,21,27-31,40-43,45 and 49-52 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 – 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 8, 10, 20, 34 and 44 are objected to because of the following informalities:

- The abovementioned claims are missing the ending period.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 25, 26 and 32 – 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang et al. (US 5,762,458).

With respect to Claims 25, 26, 37 and 38, Wang et al. teach robotic surgery system for performing a surgical procedure on a patient lying on an operating table within an operating room, the room having a support structure extending generally below the table and personnel-usable space adjacent the table, the system comprising a base; a surgical end effector; and a linkage movably supporting the end effector relative to the base, the linkage comprising a plurality of driven joints coupled to a servomechanism for moving the end effector so as to manipulate tissues; at least one pre-configuration link; and a plurality of releasably fixable joints coupled to the at least one pre-configuration link for pre-configuring the linkage, the releasably fixable joints accommodating vertical movement of the end effector relative to the base; and the base is mountable upon the support structure so as to permit the linkage to be pre-configured to extend generally upward from the base to support the end effector adjacent the patient, and wherein the linkage is pre-configurable to support the end effector adjacent the patient so that the at least one pre-configuration link and the plurality of releasably fixable joints of the pre-configured linkage are disposed generally clear of the personnel-usable space adjacent the operating table (Fig.1; Col.2, Line 33 – Col.4, Line 26).

With respect to Claims 32 – 36, Wang et al. teach wherein the robotic linkage includes a rigid shaft coupled to the end effector, and at least one of the robotic linkage, the servomechanism and a combination of the linkage and servomechanism acts to constrain the shaft to rotation about a pivot point along the shaft, and wherein actuation

of the fixable joints moves the pivot point and the shaft, or the linkage further comprising a joint sensor system coupling the fixable joints to the servomechanism, the sensor system generating joint configuration signals, wherein the servomechanism includes a computer and wherein the joint sensor system transmits the joint configuration signals to the computer, and wherein the computer calculates a coordinate system transformation between a reference coordinate system affixed relative to the base and the end effector using the joint configuration signals, and further comprising a plurality of robotic linkages, each linkage including a plurality of joints coupled to the sensor system and supporting an associated end effector, wherein the computer calculates coordinate system transformations between the reference coordinate system and each of the end effectors using the joint configuration signals, and wherein a joint signal of at least one of the sensors of the sensor system varies with an absolute position of the joint (Col.4, Line 1 – Col.7, Line 28).

4. Claim 46 is rejected under 35 U.S.C. 102(b) as being anticipated by Putman (US 5,184,601).

Putman teaches a method for preparing for robotic surgery on a patient lying on an operating table within an operating room, the surgery employing a surgical manipulator having servo-mechanically driven joints, the method comprising maintaining driven joints of the surgical manipulator sufficiently near mid points of travel of the joints so as to inhibit interference with a limit of travel of the manipulator within an intended worksite, pre-positioning the manipulator while maintaining the driven joints near the

mid points by manually articulating a linkage coupled to the manipulator and to a mounting base, the linkage accommodating vertical movement of the manipulator relative to the mounting base, and restraining the positioned manipulator with a brake system so as to prevent articulation of the linkage (Col.3, Line 26 – Col.4, Line 49).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 8 – 14, 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US 5,762,458) in view of Mizuno et al. (US 5,876,325).

With respect to Claims 1, 13 and 48, Wang et al. teach a robotic surgery system for performing a surgical procedure on a patient lying on an operating table within an operating room, the system comprising a mounting base, a surgical end effector, and a linkage movably supporting the end effector relative to the mounting base, the linkage comprising a plurality of driven joints coupled to a servomechanism for moving the end effector so as to manipulate tissues, at least one pre-configuration link, and a plurality of releasably fixable joints coupled to the at least one pre-configuration link for pre-configuring the linkage, the releasably fixable joints accommodating vertical movement of the end effector relative to the mounting base (Col.2, Line 33 – Col.4, Line 26).

However, Wang et al. fail to disclose a room having a ceiling height support structure extending generally above the table and personnel-usable space adjacent the table, and the mounting base is mountable upon the ceiling-height support structure so as to permit the linkage to be pre-configured to extend generally downward from the mounting base to support the end effector adjacent the patient.

On the other hand, Mizuno et al. teach a room having a ceiling height support structure extending generally above the table and personnel-usable space adjacent the table, and the mounting base is mountable upon the ceiling-height support structure so as to permit the linkage to be pre-configured to extend generally downward from the mounting base to support the end effector adjacent the patient (Figs.1 and 25A).

It would have been obvious to a person with ordinary skill in the art to configure the Wang et al. robotic design to be mounted on a ceiling of a surgical room or the like, as disclosed by Mizuno et al. because by mounting the robotic system from the ceiling would permit more floor space that could be used to place vital monitoring devices or other necessary equipment at the time of a surgical procedure.

With respect to Claims 2, 14 and 48, Mizuno et al. teach wherein the linkage is pre-configurable to support the end effector adjacent the patient so that the at least one pre-configuration link and the plurality of releasably fixable joints of the pre-configured linkage are disposed generally clear of the personnel-usable space adjacent the operating table (Figs.1 and 25A; Col. 3, Line 52 – Col.5, Line 18 and Col.18, Line 45 – Col.19, Line 24).

With respect to Claims 8 – 12, Wang et al. teach wherein the robotic linkage includes a rigid shaft coupled to the end effector, and at least one of the robotic linkage, the servomechanism and a combination of the linkage and servomechanism acts to constrain the shaft to rotation about a pivot point along the shaft, and wherein actuation of the fixable joints moves the pivot point and the shaft, or the linkage further comprising a joint sensor system coupling the fixable joints to the servomechanism, the sensor system generating joint configuration signals, wherein the servomechanism includes a computer and wherein the joint sensor system transmits the joint configuration signals to the computer, and wherein the computer calculates a coordinate system transformation between a reference coordinate system affixed relative to the base and the end effector using the joint configuration signals, and further comprising a plurality of robotic linkages, each linkage including a plurality of joints coupled to the sensor system and supporting an associated end effector, wherein the computer calculates coordinate system transformations between the reference coordinate system and each of the end effectors using the joint configuration signals, and wherein a joint signal of at least one of the sensors of the sensor system varies with an absolute position of the joint (Col.4, Line 1 – Col.7, Line 28).

6. Claims 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US 5,762,458) in view of Mizuno et al. (US 5,876,325), and further in view of Putman (US 5,184,601).

With respect to Claim 15, Wang et al. and Mizuno et al. teach the limitations discussed in a previous rejection, but fail to disclose a brake system releasably inhibiting inadvertent movement of the joints, wherein the sensor system is coupled to the joints so that the position signals comprise joint configuration signals of the joints.

Nevertheless, Putman teaches a brake system coupled to fixable joints, the brake system releasably inhibiting inadvertent movement of the joints, wherein the sensor system is coupled to the joints so that the position signals comprise joint configuration signals of the joints (Col.5, Line 56 – Col.6, Line 14).

It would have been obvious to a person with ordinary skill in the art to modify the Wang et al. and Mizuno et al. robotic design by including the Putman brake system because the brake system would improve the efficiency and secure performance of the robotic system by eliminating undesirable movements.

With respect to Claim 20, Wang et al. teach the first support linkage being balanced about the joints (Col.3, Lines 33 – 42).

7. Claims 22 – 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Putman (US 5,184,601) in view of Mizuno et al. (US 5,876,325).

Putman teaches a method for preparing for robotic surgery on a patient lying on an operating table within an operating room, the surgery employing a surgical manipulator having servo-mechanically driven joints, the method comprising maintaining driven joints of the surgical manipulator sufficiently near mid points of travel of the joints so as to inhibit interference with a limit of travel of the manipulator within an intended

worksite, pre-positioning the manipulator while maintaining the driven joints near the mid points by manually articulating a linkage coupled to the manipulator and to a mounting base, the linkage accommodating vertical movement of the manipulator relative to the mounting base, and restraining the positioned manipulator with a brake system so as to prevent articulation of the linkage, and wherein the pre-positioning step comprises pre-positioning the linkage so that the pre-positioned linkage is disposed generally clear of the personnel-usable space adjacent the operating table, and wherein the pre-positioning step comprises orienting a manipulator shaft towards an internal access site, the manipulator being adapted to pivot the shaft about the access site so as to manipulate tissues endoscopically (Col.3, Line 26 – Col.4, Line 49). However, Putman fails to disclose wherein the room have a ceiling-height support structure extending generally above the table and personnel-usable space adjacent the table and the base being mounted upon the ceiling-height support structure so that the pre-positioned linkage to extends generally downward from the base to support the manipulator adjacent the patient.

On the other hand, Mizuno et al. teach a room having a ceiling-height support structure extending generally above the table and personnel-usable space adjacent the table and the base being mounted upon the ceiling-height support structure so that the pre-positioned linkage to extends generally downward from the base to support the manipulator adjacent the patient (Figs.1 and 25A).

It would have been obvious to a person with ordinary skill in the art to configure the Putman robotic design to be mounted on a ceiling of a surgical room or the like, as disclosed by Mizuno et al. because by mounting the robotic system from the ceiling would permit more floor space that could be used to place vital monitoring devices or other necessary equipment at the time of a surgical procedure.

8. Claims 39 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US 5,762,458) in view of Putman (US 5,184,601).

With respect to Claim 39, Wang et al. teach the limitations discussed in a previous rejection, but fail to disclose a brake system releasably inhibiting inadvertent movement of the joints, wherein the sensor system is coupled to the joints so that the position signals comprise joint configuration signals of the joints.

Nevertheless, Putman teaches a brake system coupled to fixable joints, the brake system releasably inhibiting inadvertent movement of the joints, wherein the sensor system is coupled to the joints so that the position signals comprise joint configuration signals of the joints (Col.5, Line 56 – Col.6, Line 14).

It would have been obvious to a person with ordinary skill in the art to modify the Wang et al. robotic design by including the Putman brake system because the brake system would improve the efficiency and secure performance of the robotic system by eliminating undesirable movements.

With respect to Claim 44, Wang et al. teach the first support linkage being balanced about the joints (Col.3, Lines 33 – 42).

Allowable Subject Matter

9. Claims 3 – 7, 16 – 19, 21, 27 – 31, 40 – 43, 45 and 49 - 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

- The references of the Prior Art of record fail to teach or suggest any obvious combination of the limitations discussed above and further comprising the limitations of **(with respect to claims 3, 16, 27, 40 and 49)** wherein the brake system is biased toward the fixed configuration and the 6 brake system comprises a brake release actuator for releasing the fixable joints to a manually repositionable configuration in which the fixable joints can be manually articulated, or **(with respect to claims 21 and 45)** wherein the first support linkage includes at least one balanced, fixable, jointed-parallelogram linkage structure extending between a pair of adjacent fixable rotational joints, the jointed-parallelogram structure accommodating motion in a generally vertical direction, and the adjacent rotational joints accommodating pivotal motion about vertical axes.

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Contact Information

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edgardo San Martin whose telephone number is (703) 308-1050. The examiner can normally be reached on 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (703) 308-3370. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Edgardo San Martín
Patent Examiner
Art Unit 2837
Class 318
June 11, 2003

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